**Amendments to the Specification**

At page 2, lines 12-23:

Ideally, each of these systems would be implemented with optimal signal quality at the highest data transmission rate (or throughput). In a typical system, however, an increase in the data transmission rate compromises signal quality due to noise resulting from various system-related issues. For example, in a multi-carrier twisted-pair telephone-line system in which the twisted-pairs are bundled, crosstalk interference arises between twisted pairs arising from electromagnetic coupling within the binder that may degrade the communication signals. As the speed and/or power of data transmission increases, the crosstalk interference becomes more severe. CDMA-based and OFDM-based systems transmit the data from multiple users as symbols via the same, or a shared, frequency band, and a consequential noise concern includes inter-symbol interference (ISI). Thus, in each of these communication systems, signals from different users interfere with one another.

At page 4, lines 9-13:

According to a general embodiment, the present invention is directed to a communication system that permits multiple users to transmit data simultaneously via shared frequency and spatial resources and allocates user transmission rates via an approach that fairly allocates the transmission rates without a disproportionate allocation of system bandwidth.

At page 4, lines 14-23:

According to an example embodiment of the present invention, a communication system is adapted to permit the users to transmit data simultaneously via shared frequency and spatial resources and is adapted to allocate user transmission rates via an approach that involves setting and maintaining the transmission rates of the users. A ~~to at least a~~ minimum user transmission rate ~~to~~ provides an expected minimum quality of communication for each of the users. These user rates are incrementally adjusted by iteratively changing the transmission rate of each user as a function of a resulting vector of signal power transmitted from the users and ensuing from the

increased transmission rate, a degree of transmission-rate-allocation unfairness relative to the transmission rates of all the users, and a system-level selection criteria.

At page 7, lines 10-27:

According to a first example embodiment of the present invention, a communication system permits multiple data-transmission terminals to compete for common frequency space at the same time and in the same spatial realm. In this regard, the data-transmission terminals are transmitting their respective sets of data symbols in a manner that is susceptible to at least negligible levels of inter-symbol interference. Toward a goal of allocating the transmission rates without a disproportionate allocation of system bandwidth, the system ensures that the transmission rates of the users do not fall below a minimum-level user transmission rate to provide an expected minimum quality of communication for each of the users. These rates of the users are incrementally adjusted by changing the transmission rate of each user as a function of a resulting vector of transmit powers ensuing from the increased transmission rate, a degree of transmission-rate-allocation unfairness relative to the transmission rates of all the users, and a system-level selection criteria that is typically a function of transmission power for certain user rate allocations. The above adjustments can occur iteratively until none of the transmission rates satisfies the power-based selection criteria and/or satisfies the degree of transmission-rate-allocation unfairness. Typically, these rate adjustments are made to maximize the achievable rate of every user given the transmit power constraints.

At page 8, lines 11-25:

The communication system 100 allocates transmission rates to the multiple users (*a.k.a.*, "user terminals") 110 ~~100~~ to provide the users with proper data-transmission rates in a manner that is fair to the users. The terminal 130, using its own programmed CPU 132 and/or the CPU intelligence of the system's central station/switch 140, dictates the transmission rates of the users 110, 112 to provide at least a minimum user transmission rate ($R_{min}$) for an expected minimum quality of communication. As shown, the CPU 132 typically includes logic and memory for manipulating (*e.g.*, storing, changing and accessing) recorded power vectors (132a), for

manipulating a degree of *unfairness (U)* in rate allocation (132b), and for manipulating a shared-resource criteria (132c). Transmission-rate instructions are typically provided over the channel 120 or over an optional background data link 160. In combination therewith or as an alternative, each of the users 110, 112 is programmed to store the minimum user transmission rate ($R_{min}$) as a (default) operational mode. The expected minimum quality of communication is typically specification-defined for a given system and/or is variable for an anticipated system operating environment (*e.g.,* fewer than N users or more than M users).

At page 8, lines 26-30 and page 9, lines 1-9:

Using the receiver circuitry <u>134</u> ~~132~~ within the terminal 130 (and as further described herein), shared-frequency power parameters are monitored and used to instruct the users 110, 112 to ~~occasional~~ <u>occasionally</u> adjust each of their respective transmission rates. These transmission rates are usually adjusted one user at a time; however, applications <u>that</u> have needs for more coarse changes may permit adjustments of two or more users at a time, especially at an initial phase. The monitored shared-frequency power parameters inform the system 100 when the system-defined constraints are exceeded in order to iteratively advance the stepping of the transmission rate for designated users 110, 112. In the illustrated example embodiment, each of the designated users 110, 112 includes a CPU circuit that responds to transmission-rate instructions by adjusting a variable-data rate transmitter, typically as part of the user's transceiver. This iterative data-rate allocation process is more specifically defined below for these applications involving multiple data-transmission terminals competing simultaneously for the same frequency space and in the same spatial realm.

At page 12, lines 3-14 (*correction to mathematical operand underlined*):

Another aspect of the above-discussed approach concerns user prioritization. As discussed herein, the distribution of rates can be controlled by selecting an appropriate value of *U.* Once a value of *U* is set, the rate distribution is determined for the different users. As the system operator may occasionally benefit from having more direct control over the rate assignments of individual users, weighted rates may be used while testing for the fairness

constraint. Let $\tilde{R}_k \stackrel{def}{=} \frac{r_k}{w_k}$ be the weighted rate for the $k^{th}$ user. $w_k > 0$ is the user priority. For example, $w_k = \cancel{a,}\ \underline{\alpha,}\ w_i = 1, i \neq k$ implies that max $\left(\frac{\max(R_i)}{R_k}\right) = \frac{U}{\alpha}$, and max$\left(\frac{R_k}{\min(R_i)}\right) = \alpha U$. The user priorities may be selected using a scheduling algorithm, or based on user billing information. As would be conventional, various mechanisms may be used to determine the user priorities based on system-defined needs. Both the user priorities, and $U$ may be varied with time in order to control the distribution over time.